National Bureau of Standards
CS(E)124-45 MAY 12 1945 Taken from the Library.
Disks, Master

U. S. DEPARTMENT OF COMMERCE
HENRY A. WALLACE, Secretary
NATIONAL BUREAU OF STANDARDS
LYMAN J. BRIGGS, Director

MASTER DISKS

COMMERCIAL STANDARD (EMERGENCY) CS(E)124-45

Effective date for new production from September 15, 1945

A RECORDED VOLUNTARY STANDARD
OF THE TRADE

UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON : 1945

For sale by the Superintendent of Documents, U. S. Government Printing Office
Washington 25, D. C. - Price 5 cents

PROMULGATION

of

COMMERCIAL STANDARD (EMERGENCY) CS(E)124–45

for

MASTER DISKS

On October 14, 1944, at the instance of the War Production Board, a proposed commercial standard for master disks was circulated to manufacturers and leading user, distributor, and testing organizations for comment. A consensus of comment indicated that this draft was generally satisfactory. Following adjustment of the draft in line with comment, the recommended commercial standard was circulated on December 29, 1944, to the trade for written acceptance.

Those concerned have since accepted and approved the standard as shown herein for promulgation by the United States Department of Commerce, through the National Bureau of Standards.

The standard is effective for new production from September 15, 1945.

Promulgation recommended.

I. J. Fairchild,
Chief, Division of Trade Standards.

Promulgated:

Lyman J. Briggs,
Director, National Bureau of Standards.

Promulgation approved.

Henry A. Wallace,
Secretary of Commerce.

MASTER DISKS

COMMERCIAL STANDARD (EMERGENCY) CS(E)124–45

PURPOSE

1. The purpose of this commercial standard is to provide minimum essential requirements for master disks described herein, as a basis for better understanding between sellers and buyers, and as a basis for fair competition and identification of master disks conforming thereto.

SCOPE

2. This standard covers the major essential requirements for master disks (American Gage Design) from above 0.105 in. to and including 8.010 in.

GENERAL REQUIREMENTS

3. *Material.*—For purposes of this standard, tool steel means a high quality electric furnace alloy steel, alloy tool steel, or carbon tool steel free from all imperfections which might mar the finished surface of the product.

4. *Seasoning.*—For purposes of this standard, seasoning shall include an appropriate treatment for the artificial ageing of tool steel to prevent distortion or dimensional change after the surfaces have been finished.

5. *Finish.*—For the purposes of this standard the following designations for surface finishes apply:

5a. *Ground.*—All finish-ground surfaces shall be smooth and free from objectionable chatter, tool marks, irregular wheel marks, burning or scratches.

5b. *Lapped.*—A lapped surface shall be lapped to give a uniform, truly cylindrical, smooth surface free from all traces of machining or grinding and shall show no evidence of objectionable scratching.

DETAIL REQUIREMENTS

6. *Design.*—Master disks shall be made according to the designs adopted by the American Gage Design Committee and promulgated in latest revision of Gage Blanks, Commercial Standard CS8. Master disks shall be ground and lapped.

7. *Material.*—Master disks shall be tool steel, hardened, drawn and seasoned, or material of equal or greater resistance to wear.

8. *Styles.*—The styles of American Gage Design master disks are given and illustrated in latest revision of CS8.

9. *Hardness.*—Master disks shall have a minimum Rockwell hardness of C63 or equivalent surface hardness.

10. *Sizes.*—Sizes of master disks range from above 0.105 in. to and including 8.010 in. in diameter.

11. *Accuracy.*—Master disks shall be ground and lapped to specified diameter (nominal size) within the tolerances of the class specified (table 1). These tolerances shall apply to all diameters between points 1/16 in. in from the ends of the full working surface. Total variations in roundness and/or taper shall not exceed one-half the size tolerance.

TABLE 1.—*Tolerance on diameter for master disks*

[Classes XX, X, Y, gage makers tolerances]

Sizes		Total tolerance[1] on nominal size		
Above	Up to and including	Class XX	Class X	Class Y
in.	*in.*	*in.*	*in.*	*in.*
0.105	0.825	0.000 02	0.000 04	0.000 07
.825	1.510	.000 03	.000 06	.000 09
1.510	2.510	.000 04	.000 08	.000 12
2.510	4.510	.000 05	.000 10	.000 15
4.510	6.510	.000 065	.000 13	.000 19
6.510	8.010	.000 08	.000 16	.000 24

[1] Tolerance may be taken in plus direction, minus direction, or split half above and half below nominal size, as specified by purchaser.

METHODS OF TEST

12. *Cylindrical trueness* (*roundness and taper*) shall be tested in a comparator of suitable amplification. Roundness may be tested in a multiple contact anvil such as a V block. Any equivalent method may be used.

13. *Trueness to size* shall be determined at 68 degrees F by means of a measuring machine or a vertical or horizontal comparator of suitable amplification used with gage blocks of suitable accuracy and with a 1-lb measuring load, except that for nominal diameters above 4.510 in. a 2½-lb load may be used. In making the above measurements the measuring accuracy of the instruments used should be adequate in relation to specified disk tolerances. An equivalent measuring method may be used.

PACKING

14. Each master disk shall be supplied in a suitable, protective case or box. As a protection against climatic conditions, each master disk shall be coated with a suitable noncorrosive oil or grease, and be securely wrapped in waxed paper or its equivalent.

MARKING

15. *Size and class designation.*—Where practicable, each master disk shall have legibly and permanently marked upon it in characters not less than 0.025 in. high the nominal size and class (XX, X, or Y) of the disk.

16. *Manufacturer's name or trade mark.*—Where practicable, each master disk shall have legibly and permanently marked upon it in

characters not less than 0.025 in. high, the manufacturer's name or trade mark.

17. *Identification.*—In order to provide purchasers with a ready means of identification, it is recommended that where practicable, each master disk which complies with this standard, be marked "CS124–45" in characters not less than 0.025 in. high.

18. It is further recommended that catalog descriptions, sales literature, and slips accompanying master disks complying with this standard should incorporate the following statement:

> This master disk complies with all the applicable requirements of Commercial Standard (Emergency) CS(E)124–45 as issued by the National Bureau of Standards of the United States Department of Commerce.

EFFECTIVE DATE

19. The standard is effective for new production from September 15, 1945.

STANDING COMMITTEE

20. The following individuals comprise the membership of the standing committee, which is to review, prior to circulation for acceptance, revisions proposed to keep the standard abreast of progress. Comment concerning the standard and suggestions for revision may be addressed to any member of the committee or to the Division of Trade Standards, National Bureau of Standards, which acts as secretary for the committee:

P. V. Miller (chairman), The Taft-Peirce Manufacturing Co., Woonsocket, R. I.
Raymond S. Fox, Pratt & Whitney, Division Niles-Bement-Pond Co., West Hartford, Conn.
Albert Polk, The Sheffield Corporation, Dayton 1, Ohio.
W. H. Gourlie, W. H. Gourlie Co., P. O. Box 1135, Hartford, Conn.
H. P. Gee, Dodge Main Plant 4, Chrysler Corporation, P. O. Box 1259, Detroit 31, Mich.
L. M. McPharlin, Curtiss-Wright Corporation, Propeller Division, Caldwell, N. J.
Merlin J. Barret, International Business Machines Corporation, Endicott, N. Y.
Lt. Col. Spencer B. Terry, Bureau of Ordnance, Navy Department, Room 4214 Navy Building, Washington 25, D. C.
Col. H. B. Hambleton, Ordnance Department, U. S. Army, 2C439 Pentagon Building, Washington 25, D. C.
D. R. Miller, National Bureau of Standards, Washington 25, D. C.
R. W. Christie, United States Testing Co., Inc., 1415 Park Ave., Hoboken, N. J.
Lt. Col. A. F. Wentzel, Procurement Division, ATSC, Wright Field, Dayton, Ohio.
Major Merrill S. Hugo, Ordnance Department, Army Service Forces, San Francisco Ordnance District, 100 McAllister St., San Francisco, Calif.

HISTORY OF PROJECT

21. The War Production Board, on September 30, 1943, requested the cooperation of the National Bureau of Standards in the establishment of commercial standards for precision hand tools falling in several categories, one of these being tool room specialties. A preliminary manufacturers' conference in New York City, on December 15, 1943, reviewed a preliminary draft and directed that related groups

of the items covered by this draft be submitted for comment by the manufacturers directly concerned.

22. Further development in accordance with the directions of the conference was continued by correspondence. On September 12, 1944, agreeable to the suggestion of the Industry Committee Chairman, a conference of gage manufacturers and users, held at the National Bureau of Standards, Washington, D. C., reviewed a separate draft of a proposed commercial standard for master disks of American Gage Design Committee styles.

23. This proposed commercial standard as adjusted by that conference was circulated on October 14, 1944, to manufacturers and leading user, distributor, and testing organizations for comment. The comment received indicated that the draft was generally satisfactory. Following adjustment of the draft in line with comment, the recommended commercial standard was circulated on December 29, 1944, to the trade for written acceptance.

24. Upon receipt of requisite acceptances in writing, from the trade, including manufacturers representing satisfactory majority by volume of production, announcement was issued on March 15, 1945, that the standard would become effective for new production from September 15, 1945.

ACCEPTANCE OF COMMERCIAL STANDARD

If acceptance has not previously been filed, this sheet properly filled in, signed, and returned will provide for the recording of your organization as an acceptor of this commercial standard.

Date_____

Division of Trade Standards,
National Bureau of Standards,
Washington 25, D. C.

Gentlemen:

We believe that the Commercial Standard CS(E)124–45 constitutes a useful standard of practice, and we individually plan to utilize it as far as practicable in the

Production [1] Distribution [1] Use [1] Testing [1]

of master disks.

We reserve the right to depart from it as we deem advisable.

We understand, of course, that only those articles which actually comply with the standard in all respects can be identified or labeled as conforming thereto.

(Cut on this line)

Signature of authorized officer_____
(In ink)

(Kindly typewrite or print the following lines)

Name and title of above officer_____

Organization_____
(Fill in exactly as it should be listed)

Street address_____

City, zone, and State_____

[1] Underscore which one. Please see that separate acceptances are filed for all subsidiary companies and affiliates which should be listed separately as acceptors. In the case of related interests, trade papers, etc., desiring to record their general support, the words "General Support" should be added after the signature.

TO THE ACCEPTOR

The following statements answer the usual questions arising in connection with the acceptance and its significance:

1. *Enforcement.*—Commercial standards are commodity specifications voluntarily established by mutual consent of those concerned. They present a common basis of understanding between the producer, distributor, and consumer and should not be confused with any plan of governmental regulation or control. The United States Department of Commerce has no regulatory power in the enforcement of their provisions, but since they represent the will of the interested groups as a whole, their provisions through usage soon become established as trade customs, and are made effective through incorporation into sales contracts by means of labels, invoices, and the like.

2. *The acceptor's responsibility.*—The purpose of commercial standards is to establish for specific commodities, nationally recognized grades or consumer criteria and the benefits therefrom will be measurable in direct proportion to their general recognition and actual use. Instances will occur when it may be necessary to deviate from the standard, and the signing of the acceptance does not preclude such departures; however, such signature indicates an intention to follow the commercial standard where practicable, in the production, distribution, or consumption of the article in question.

3. *The Department's responsibility.*—The major function performed by the Department of Commerce in the voluntary establishment of commercial standards on a Nation-wide basis is fourfold: first, to act as an unbiased coordinator to bring all interested parties together for the mutually satisfactory adjustment of trade standards; second, to supply such assistance and advice as past experience with similar programs may suggest; third, to canvass and record the extent of acceptance and adherence to the standard on the part of producers, distributors, and users; and fourth, after acceptance, to publish and promulgate the standard for the information and guidance of buyers and sellers of the commodity.

4. *Announcement and promulgation.*—When the standard has been endorsed by a satisfactory majority of production or consumption in the absence of active, valid opposition, the success of the project is announced. If, however, in the opinion of the standing committee or the Department of Commerce, the support of any standard is inadequate, the right is reserved to withhold promulgation and publication.

ACCEPTORS

25. The organizations listed below have individually accepted this standard for use as far as practicable in the production, distribution, testing, or use of master disks. In accepting the standard they reserved the right to depart therefrom as they individually deem advisable. It is expected that articles which actually comply with the requirements of this standard in all respects will be regularly identified or labeled as conforming thereto, and that purchasers will require such specific evidence of conformity.

ASSOCIATIONS

American Association of Engineers, Chicago, Ill. (General support.)
American Society of Tool Engineers, Potomac Chapter #48, Washington, D. C. (General support.)

FIRMS

Abrasive Machine Tool Co., East Providence, R. I.
Accurate Tool Co., Detroit, Mich.
Ace Manufacturing Corporation, Philadelphia, Pa.
Acme Fishing Tool Co., Parkersburg, W. Va.
Acme Fishing Tool Co., Pattin Brothers Division, Marietta, Ohio.
Advance Manufacturing, Inc., Detroit, Mich.
Agerstrand Corporation, Muskegon, Mich.
Air Associates, Inc., Teterboro, N. J.
Alliance Manufacturing Co., Alliance, Ohio.
Allied Tool Co., New York, N. Y.
Allsteel Pump Co., Los Angeles, Calif.
American Chain & Cable Co., Inc., New York, N. Y.
American Instrument Co., Silver Spring, Md.
American Saw Mill Machinery Co., Hackettstown, N. J.
American Tool Works Co., The, Cincinnati, Ohio.
Andover Motors Corporation, Elmira, N. Y.
Arter Grinding Machine Co., Worcester, Mass.
Autocar Co., The, Ardmore, Pa.
Automatic Products Co., Milwaukee, Wis.
Automatic Transportation Co., Chicago, Ill.
Avey Drilling Machine Co., The, Covington, Ky.
Axelson Manufacturing Co., Los Angeles, Calif.
Baker Ice Machine Co., Inc., Omaha, Nebr.
Baker Raulang Co., The, Cleveland, Ohio.
Bardco Manufacturing & Sales Co., Los Angeles, Calif.
Bauer Bros. Co., The, Springfield, Ohio.
Bearing Service Co., Pittsburgh, Pa.
Beech Aircraft Corporation, Wichita, Kans.
Berger Engineering Works, Inc., Seattle, Wash.
Bodine Electric Co., Chicago, Ill.
Boeing Airplane Co., Wichita Division, Wichita, Kans.
Boston Machine Works Co., Lynn, Mass.
Bowser, Inc., Dexter Division, Chelsea, Mich.
Bowser Morner Testing Laboratories, Dayton, Ohio.
Bradford Machine Tool Co., The, Cincinnati, Ohio.
Brady, Inc., F. A., New York, N. Y.
Bramson Publishing Co., The, Detroit, Mich. (General support.)
Brickner-Kropf Machine Co., Muskegon Heights, Mich.
Buda Co., The, Harvey, Ill.
Buerk Tool Works, Buffalo, N. Y.
Busch Sulzer Bros. Diesel Engine Co., St. Louis, Mo.
Catholic University of America, The, Washington, D. C.
CedarRapids Engineering Co., Cedar Rapids, Iowa.
Central Scientific Co., Chicago, Ill.
Chicago Rivet & Machine Co., Bellwood, Ill.
Chrysler Corporation, Detroit, Mich.
Clatfelter Gage Co., H. C., Ferndale, Mich.
Clemson College, Clemson, S. C.
Consolidated Car-Heating Co., Inc., Albany, N. Y.
Covel Manufacturing Co., Benton Harbor, Mich.
Cramp Shipbuilding Co., Philadelphia, Pa.
Curtiss-Wright Corporation, Propeller Division, Caldwell, N. J.
Davenport Besler Corporation, Davenport, Iowa.
Deere & Co., Moline, Ill.
Delaware, University of, Newark, Del.
Detroit Testing Laboratory, The, Detroit, Mich. (General support.)
Detroit Testing Machine Co., Detroit, Mich.
Detroit Universal Duplicator Co., Detroit, Mich.
Diamant Tool, Machine & Manufacturing Co., Inc., Newark, N. J.
Domestic Engine & Pump Co., Shippensburg, Pa.
Dravo Corporation, Pittsburgh, Pa.
Eastman Kodak Co., Hawk-Eye Division, Rochester, N. Y.
Eby, Inc., Hugh H., Philadelphia, Pa.
Eitzen Co., Louis C., New York, N. Y.
El Paso Testing Laboratories, El Paso, Tex. (General support.)
Electric Auto-Lite Co., The, Bay Manufacturing Division, Bay City, Mich.
Electric Boat Co., Groton, Conn.
Electric Srpayit Co., Sheboygan, Wis.
Electrol, Inc., Kingston, N. Y.
Erie Forge Co., Erie, Pa.
Erie Forge & Steel Co., Erie, Pa.
Fairbanks Morse & Co., Beloit, Wis.
Fairchild Engine & Airplane Corporation, Fairchild Aircraft Division, Hagerstown, Md.
Fairmont Railway Motors, Inc., Fairmont, Minn.
Fay & Scott, Dexter, Maine.
Federal Bearings Co., Inc., The, Poughkeepsie, N. Y.
Federal Products Corporation, Providence, R. I.
Fosdick Machine Tool Co., The, Cincinnati, Ohio.
Galland-Henning Manufacturing Co., Milwaukee, Wis.
Genaflash Co., Albany, N. Y.
General Machine Works, York, Pa.
General Machinery Corporation, Hamilton, Ohio.
General Motors Corporation, Detroit, Mich.
General Motors Corporation, AC Spark Plug Division, Flint, Mich.
General Motors Corporation, Cadillac Motor Car Division, Detroit, Mich.
General Motors Corporation, Cleveland Diesel Engine Division, Cleveland, Ohio.
Geometric Tool Co., The, New Haven, Conn.
Gisholt Machine Co., Madison, Wis.
Globe Aircraft Corporation, Fort Worth, Tex.
Goodyear Aircraft Corporation, Akron, Ohio.
Gordon Co., Claud S., Chicago, Ill.
Gourlie Co., W. H., Hartford, Conn.
Granite State Machine Co., Inc., Manchester, N. H.
Great Lakes Stamping & Manufacturing Co., Toledo, Ohio.
Greenfield Tap & Die Corporation, Greenfield, Mass.
Grip Nut Co., South Whitley, Ind.
Gulf Research & Development Co., Pittsburgh, Pa.
Gurley, W. & L. E., Troy, N. Y.
Hale, George A., St. Louis, Mo.
Hallmark, Laboratories, The, Jamestown, N. Y.
Hamilton Tool Co., The, Hamilton, Ohio.
Hancock Manufacturing Co., Jackson, Mich.
Haynes Stellite Co., Kokomo, Ind.
Hendey Machine Co., The, Torrington, Conn.
Herkimer Tool & Model Works, Herkimer, N. Y.
Hill Acme Co., The, Cleveland, Ohio.
Houdaille Hershey Corporation, Houde Engineering Division, Buffalo, N. Y.
Hughes Tool Co., Houston, Tex.

Hunter Engineering Co., Riverside, Calif.
Hunter Pressed Steel Co., Lansdale, Pa.
Huron Machine Products, Detroit, Mich.
Index Machine & Tool Co., Jackson, Mich.
Inferno Co., The, Shreveport, La.
International Business Machines Corporation, Endicott, N. Y.
International Derrick & Equipment Co., Columbus Ohio.
International Detrola Corporation, Foster Division, Elkhart, Ind.
Interstate Aircraft & Engineering Corporation, El Segundo, Calif.
Jansson Gage Co., Detroit, Mich.
Johnson Automatics Manufacturing Co., Providence, R. I.
Johnson Gage Co., Bloomfield, Conn.
Johnson Motors, Waukegan, Ill. (General support.)
Kaiser Co., Inc., Richmond Shipyard No. 3, Richmond, Calif.
Kartsher, H. S., Cleveland, Ohio.
Kearney & Trecker Corporation, Milwaukee, Wis.
Kellner Tool & Machine Co., Detroit, Mich.
Kennedy Van Saun Manufacturing & Engineering Corporation, Danville, Pa.
Kinner Motors Inc., Glendale, Calif.
Landis Machine Co., Waynesboro, Pa.
Langlois Gauge Co., Detroit, Mich.
Laucks Laboratories, Inc., Seattle, Wash.
Leeds & Northrup Co., Philadelphia, Pa.
Lincoln Park Industries, Inc., Lincoln Park, Mich.
Link-Belt Ordnance Co., Chicago, Ill.
Liquid Carbonic Corporation, Chicago, Ill.
Lockheed Aircraft Corporation, Burbank, Calif.
Lucas Machine Tool Co., The, Cleveland, Ohio.
Machined Products Co., Louisville, Ky.
Mack Manufacturing Corporation, Allentown, Pa.
Macnick Co., Tulsa, Okla.
Mason & Co., Inc., Marcus, Westboro, Mass.
Menasco Manufacturing Co., Burbank, Calif.
Merritt Engineering & Sales Co., Inc., Lockport, N. Y.
Merz Engineering Co., Indianapolis, Ind.
Messinger Bearings, Inc., Philadelphia, Pa.
Metrical Laboratories, Inc., Ann Arbor, Mich.
Metro Tool & Gage Co., Chicago, Ill.
Miami Shipbuilding Corporation, Miami, Fla.
Michigan, University of, Ann Arbor, Mich.
Midwestern Tool Co., Chicago, Ill.
Minneapolis-Moline Power Implement Co., Minneapolis, Minn.
Minnesota, University of, Minneapolis, Minn.
Morey Machinery Co., Inc., Astoria, L. I., N. Y.
Napoleon Products Co., The, Napoleon, Ohio.
Nash Kelvinator Aircraft Division, Kenosha, Wis.
National Acme Co., The, Cleveland, Ohio.
National Cash Register Co., Dayton, Ohio.
National Die Casting Co., Chicago, Ill.
National Supply Co., Superior Engine Division, Springfield, Ohio.
New Paris Gage & Tool Co., New Paris, Ohio.
New York Testing Laboratories, Inc., New York, N. Y.
New York University, New York, N. Y. (General support.)
Newark College of Engineering, Newark, N. J.
Newport News Shipbuilding & Dry Dock Co., Newport News, Va.
Norma-Hoffman Bearings Corporation, Stamford, Conn.
Northrop Aircraft, Inc., Hawthorne, Calif.
Norton Co., Worcester, Mass.
Ohlsson & Rice Manufacturing Co., Los Angeles, Calif.
Oil Well Supply Co., Imperial Works, Oil City, Pa.
Oliver Iron & Steel Corporation, Pittsburgh, Pa.
Oregon State College, Corvallis, Oreg.
Pacific Car & Foundry Co., Renton, Wash.
Pacific Gear Plant, Los Angeles, Calif.
Patzig Testing Laboratories, Des Moines, Iowa.
Peck, Stow & Wilcox Co., The, Southington, Conn.
Penn General Supply Co., Pittsburgh, Pa.
Pettibone Mulliken Corporation, Chicago, Ill.
Pfiffner Machine Co., St. Louis, Mo.
Pioneer Engineering & Manufacturing Co., Detroit, Mich.
Pioneer Pump & Manufacturing Co., Detroit, Mich.
Pipe Machinery Co., The, Cleveland, Ohio.
Plan-O-Mill Corporation, Hazel Park, Mich.
Pollak Manufacturing Co., Arlington, N. J.
Portman Machine Tool Co., New Rochelle, N. Y.
Pratt & Whitney Aircraft Corporation, East Hartford, Conn. (General support.)
Pratt & Whitney Division, Niles-Bement-Pond Co., West Hartford, Conn.
Pusey & Jones Corporation, The, Wilmington, Del.
Quality Hardware & Machine Corporation, Chicago, Ill.
Quality Tool & Die Co., Indianapolis, Ind.
Redmond Co., A. G., Owosso, Mich.
Rensselaer Polytechnic Institute, Troy, N. Y.
Rogers Machine Works, Inc., Alfred, N. Y. (General support.)
Rollway Bearing Co., Inc., Syracuse, N. Y.
Sales Service Machine Tool Co., St. Paul, Minn.
Scandia Machine & Die Corporation, Brooklyn, N. Y.
Schatz Manufacturing Co., The, Poughkeepsie, N. Y.
Schrillo Aero Tool Engineering Co., Los Angeles, Calif.
Sheffield Corporation, The, Dayton, Ohio.
Sibley Machine & Foundry Corporation, South Bend, Ind
Skinner Engine Co., Erie, Pa. (General support.)
Smalley-General Co., Bay City, Mich.
Smith Bearings Co., L. C., Chicago, Ill.
Smith-Emery Co., Los Angeles, Calif.
Snap/On Tools Corporation, Kenosha, Wis.
Snow Manufacturing Co., Chicago, Ill.
Solar Aircraft Co., San Diego, Calif.
Southern Testing Laboratories, Inc., Birmingham, Ala.
Squiers Gage Co., Berkley, Mich.
Standard Aircraft, Dayton, Ohio.
Standard Gage Co., Inc., Poughkeepsie, N. Y.
Standard Machinery Co., Providence, R. I.
Standard Screw Co., The, Chicago, Ill.
Stapling Machines Co., Rockaway, N. J.
Steel City Testing Laboratory, Detroit, Mich.
Steeltest Instrument & Manufacturing Co., Detroit, Mich.
Streeter-Amet Co., Chicago, Ill.
Swarthmore College, Swarthmore, Pa.
Swedish Gage Co. of America, Detroit, Mich.
Taft-Peirce Manufacturing Co., The, Woonsocket, R. I.
Taylor Instrument Cos., Rochester, N. Y.
Teletype Corporation, Chicago, Ill.
Trundle Engineering Co., The, Cleveland, Ohio.
Tubular Micrometer Co., St. James, Minn.
Tufts College, Medford, Mass.
Twin City Testing & Engineering Laboratory, St. Paul, Minn.
Twining Laboratories, The, Fresno, Calif.
Tyson Bearing Corporation, Massillon, Ohio.
U. S. Pipe & Manufacturing Co., San Francisco, Calif.
United States Testing Co., Inc., Hoboken, N. J.
Universal Engineering Co., Frankenmuth, Mich.
Van Keuren Co., The, Watertown, Mass.
Van Trump Testing Laboratory, Chicago, Ill.
Vard Inc., Pasadena, Calif.
Waltham Precision Tool Co., Waltham, Mass.
Warner Aircraft Corporation, The, Detroit, Mich.
Weatherhead Co., The, Cleveland, Ohio.
Western Electric Co., Inc., New York, N. Y.
Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.
Wicaco Machine Corporation, Philadelphia, Pa.
Wickman Corporation, The, Detroit, Mich.
Williams Inspection Co., A. W., Mobile, Ala.
Willsea Works, Rochester, N. Y.
Wisconsin Motor Corporation, Milwaukee, Wis.
Worthington Pump & Machinery Corporation, Buffalo Works, Buffalo, N. Y.
York Corporation, York, Pa.
Young Engine Corporation, Canton, Ohio.
Zehnder Engineering Service, Louisville, Ky.

U. S. GOVERNMENT

Agriculture, U. S. Department of, Washington, D. C.
Navy Department, Bureau of Ordnance, Washington, D. C.
War Department, Washington, D. C.
War Production Board, Washington, D. C.